

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1-17. (Canceled)

18. (Original) A ferromagnetic semiconductor-based read head sensor configured to detect magnetic domain orientations in a magnetic recording medium having a plurality of domains, each domain having a magnetization, the sensor comprising:

a substrate defining a plane;

a ferromagnetic semiconductor epilayer formed on said substrate, said epilayer having a cubic hard axis; and

first and second read current contacts, each contact coupled proximal an end of the epilayer, said contacts being configured to provide an electrical current flow along the hard axis; and

one or more read probes, in electrical contact with the epilayer, configured to detect transverse magnetic resistance in the epilayer;

wherein application of an in-plane magnetic field, non-aligned with the cubic hard axis, produces a transition in the transverse magnetic resistance of the epilayer, and wherein the magnetization of each domain produces a magnetic field having a component non-aligned with the cubic hard axis when the read head is positioned proximal thereto.

19. (Original) The sensor of claim 18, wherein the epilayer is substantially elongated and oriented along the cubic hard axis.

20. (Original) The sensor of claim 18, wherein the substrate is one of a GaAs substrate and a GaN substrate, and wherein the epilayer includes one of a Mn doped GaAs layer and a Mn doped GaN layer.

21. (Original) The sensor of claim 18, wherein the epilayer includes a type III-V semiconductor material.

22. (Original) The sensor of claim 18, further including at least one electric coil proximal the substrate and epilayer for generating a saturation magnetic field of desired orientation and magnitude within the epilayer.

23. (Original) A method of detecting changes in magnetic domain orientations in a magnetic recording medium using a ferromagnetic semiconductor-based read head sensor, the method comprising:

positioning a read head sensor proximal a magnetic recording medium having a plurality of domains, each domain having a magnetization, wherein the read head sensor includes a ferromagnetic semiconductor epilayer structure defining a plane and having a cubic hard axis; moving the read head position relative to the domains in a sequential order; and detecting changes in the transverse magnetic resistance of the epilayer structure; wherein application of an in-plane magnetic field, non-aligned with the cubic hard axis, produces a transition in the transverse magnetic resistance of the epilayer, and wherein the magnetization of each domain produces a magnetic field having a component non-aligned with the cubic hard axis when the read head is positioned proximal thereto.

24. (Original) The method of claim 23, wherein the substrate is one of a GaAs substrate and a GaN substrate, and wherein the epilayer includes one of a Mn doped GaAs layer and a Mn doped GaN layer.

25. (Original) The method of claim 23, wherein the magnetic recording medium is substantially circular, and wherein moving includes rotating the magnetic recording medium.

26. (Original) The method of claim 23, wherein the epilayer includes a type III-V semiconductor material.

27. (Original) The method of claim 23, further including generating a saturation magnetic field of desired orientation and magnitude within the epilayer using at least one electric coil positioned proximal the substrate and epilayer.